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U.S. OIL SANDS
www.usoilsandsinc.com

September 9, 2015

RECEIVED
SEP 09 2015
Div. of Oil, Gas & Mining

Mr. John Baza
State of Utah
Department of Natural Resources
Division of Oil, Gas and Mining
1594 West North Temple, Suite 1210
Salt Lake City, Utah 84114-5801

Re: **M/047/0090 - U.S. Oil Sands, Inc., PR Spring Mine - Amendment to Notice of Intention to Commence Large Mining Operations**

Dear Mr. Baza:

On July 17, 2015 the Division of Oil, Gas and Mining issued a final decision approving the revised NOI to the PR Spring Mine Plan (M0470090). The Division gave final approval of the revised NOI conditioned on the Operator amending the NOI to (1) establish a monitoring program for potential effects to the possible subsurface water system, and (2) include further evidence of the Operator's compliance with the appropriate air quality regulatory authority or authorities.

U.S. Oil Sands, Inc. is herewith submitting an MR-REV amendment form and the supportive documentation to address the two conditions stated herein. These updates adjusted the Table of Contents, pages 32-54 and Appendix B of the existing revised NOI. A marked copy and clean copy are included with the enclosure.

Feel free to contact me if you have any questions on this information. As always, we appreciate your help with our permitting needs.

Sincerely,

Doug Thornton
HSE & Regulatory Manager

enclosures

Before the Utah Division of Oil, Gas and Mining
Department of Natural Resources
State of Utah

In the Matter of: Protest of the tentative decision to approve the Revised Notice of Intention to Commence Large Mining Operations, PR Spring Mine, Uintah and Grand Counties, Utah.	**Final Decision Approving Revised NOI** M/047/0090

The Division of Oil, Gas and Mining ("Division") held an informal conference to review its tentative decision to approve a revision to a mining permit. The mine operator, U.S. Oil Sands, Inc., ("Operator") had filed a Revised Notice of Intention to Commence Large Mining Operations ("Revision") with the Division last year. After multiple requests to amend and responsive amendments, the Division issued a tentative approval of the Revision to which it received written objections, which resulted in the informal conference.

The conference was held at 9:00 AM on June 30, 2015 in the auditorium at the Department of Natural Resources, 1594 West North Temple, Salt Lake City, Utah. John R. Baza, Director of Oil, Gas and Mining presided over the informal conference with the assistance of Douglas J. Crapo, Assistant Attorney General. The Division presented Paul Baker, Minerals Program Manager, and April Abate, Environmental Scientist III, and was represented by Steven F. Alder, Assistant Attorney General. Protestant Living Rivers, represented by Rob Dubuc, Western Resource Advocates, presented Dr. William Johnson and his work to the Presiding Officer. The Operator U.S. Oil Sands, Inc., represented by A. John Davis, III and M. Benjamin Machlis, Holland & Hart, presented Barclay Cuthbert, Vice President of Operations.

In addition to these parties, the Presiding Officer heard from Vaughn Lovejoy, Tim Wagner, Tory Hill, Kathryn Albury, Jill Merritt, Suzanne Stensaas, Tanja London, Hans Ehrbar, Kaitlin Butler, Tina Smith, Bob Brister, Sara Caldwell, Sarah Stock, Miranda Pratt, Allison Jones, Tom Faddies, Sean Porter, and Nancy Evenson.

The Operator had previously obtained a mining permit in 2009. The Board upheld the Division's approval in late 2012 and issued its Memorandum Decision in early 2013. Last year, the Operator submitted a revision to the existing mining plan, which expanded the disturbed area. On April 7, 2015 the Division issued a tentative approval to the Revision and published its decision on June 14, 2015 in the Salt Lake Tribune and Deseret Morning News; June 16, 2015 in the Uintah Basin Standard and Vernal Express; and June 18, 2015 in the Moab Times-Independent (Emery and Grand Counties). Because the Division received timely written objections of substance, the Division held this informal conference under the Utah Mined Land Reclamation Act, Utah Code Ann. § 40-8-13(d)(3) (West 2014), the Utah Administrative

Procedures Act, § 63G-4-203, and the Division's Administrative Procedures Rule, Utah Admin. Code Rule R647-5 (2015), http://www.rules.utah.gov/publicat/code.htm. In addition to the submitted objections, the Division received comments supporting the approval of the Revision.

When submitting an NOI, operators must describe potential surface and/or subsurface impacts. R647-4-109. The description must include projected effects on surface and groundwater systems, R647-4-106(8), and -109(1); identify any deleterious material that will be left on the mine site, R647-4-106(2); and projected effects on air quality, R647-4-109(4).

After careful review and consideration of the comments and objections presented before and at the conference, the Division gives its final approval of the Revised NOI conditioned on the Operator amending the NOI to (1) establish a monitoring program for potential effects to the possible subsurface water system, and (2) include further evidence of the Operator's compliance with the appropriate air quality regulatory authority or authorities. Those amendments must be submitted to the Division by November 1, 2015, and the Operator must not process ore until the Division approves the amendments.

An aggrieved party that participated in the conference or an applicant that is aggrieved by a conditioned approval may appeal this decision to the Board of Oil, Gas and Mining as a formal adjudicative proceeding under Rule 647-5-106(17) and Rule R641 by filing an appeal with the Board Secretary, Ms. Julie Ann Carter within ten (10) days of receipt of this decision. Ms. Carter's address is Board of Oil, Gas and Mining, 1594 West North Temple, Suite 1210, Salt Lake City, Utah, 84116 and her phone number is (801) 538-5277.

DATED this 17th day of July, 2015.

DIVISION OF OIL, GAS AND MINING

John R. Baza, Director Oil, Gas & Mining

Form MR-REV-att (DOGM – Revise/Amend Change Form)
(Revised September 14, 2005)

Application for Mineral Mine Plan Revision or Amendment

Operator: U.S. Oil Sands Inc.

Mine Name: PR Spring Mine **File Number: M/** 047-0090

Provide a detailed listing of all changes to the mining and reclamation plan that will be required as a result of this change. Individually list all maps and drawings that are to be added, replaced, or removed from the plan. Include changes of the table of contents, section of the plan, pages, or other information as needed to specifically locate, identify and revise or amend the existing Mining and Reclamation Plan. **Include page, section and drawing numbers as part of the description.**

DETAILED SCHEDULE OF CHANGES TO THE MINING AND RECLAMATION PLAN

			DESCRIPTION OF MAP, TEXT, OR MATERIALS TO BE CHANGED
☐ ADD	☒ REPLACE	☐ REMOVE	Table of Contents
☐ ADD	☒ REPLACE	☐ REMOVE	(pgs. 32-54) references to water monitoring & air quality
☒ ADD	☐ REPLACE	☐ REMOVE	(Appendix B) correspondence & water monitoring program
☐ ADD	☐ REPLACE	☐ REMOVE	
☐ ADD	☐ REPLACE	☐ REMOVE	
☐ ADD	☐ REPLACE	☐ REMOVE	
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☐ ADD	☐ REPLACE	☐ REMOVE	

I hereby certify that I am a responsible official of the applicant and that the information contained in this application is true and correct to the best of my information and belief in all respects with the laws of Utah in reference to commitments and obligations, herein.

Doug Thornton
Print Name

[signature] HSE & Regulatory Mgr.
Sign Name, Position

Sept. 9, 2015
Date

Return to:

State of Utah
Department of Natural Resources
Division of Oil, Gas and Mining
1594 West North Temple, Suite 1210
Box 145801
Salt Lake City, Utah 84114-5801
Phone: (801) 538-5291 Fax: (801) 359-3940

FOR DOGM USE ONLY:
File #: M/ /
Approved:
Bond Adjustment: from ($)
to $

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gradient to the north. As noted above, this was confirmed by the operator's two production wells, located within about one mile of the Phase 1 project area. (One of those wells intercepted a small amount of water at a depth of about 670 feet, which is about the same elevation as the nearby Main Canyon floor.)

At their maximum depth of approximately 150 feet below ground surface, none of the three Phase 1 pits are expected to encounter or approach this regional groundwater table. Further, because mining occurs on the hydrologically isolated interfluve between PR and Main Canyon, the Phase 1 mining will not affect groundwater gradient or quality. Litigation challenging the definition of ground water in this area was eventually dismissed by the Secretary who determined that there was only a limited amount of shallow, localized ground water at the site that is not part of a regional aquifer system (Supreme Court of the State of Utah opinion 2014 UT 25).

The operator's use of up to 360 acre-feet per year of groundwater obtained from the two production wells that intercept the deep regional aquifer will not adversely impact the local groundwater regime. Water usage is estimated at approximately 168,480 gallons per day and 61.5 million gallons per year (189 acre-feet). The wells draw from the deep, low quality regional aquifer that is not a source for natural surface expressions or other wells in the region. The State Engineer confirmed this absence of connectivity in early 2014 in resolving a protest on a temporary change application to allow additional uses and places of use associated with the water right. The State Engineer found that neither production well is impacting a spring in the bottom of Main Canyon located approximately 3/4 mile south of one of the production wells and which discharges at an elevation of 7,440 (approximately 1,000 feet higher than the static water level in the wells).

The operator and DWQ have reviewed the project's Permit by Rule coverage under DWQ's Groundwater Protection Program. DWQ continues to support the *de minimus* impact of the project (including the planned pit backfills with processed solids) on groundwater resources. Copies of related correspondence are included in **Appendix B**.

In July of 2015 the Division of Oil, Gas and Mining requested that the operator submit an amendment to this NOI to establish a monitoring program for potential effects to the possible subsurface water system. Copies of the related correspondence, the associated spring and well evaluations and the full detailed monitoring program are included in **Appendix B**.

The monitoring program includes monitoring of USOS's deep water wells PW-1 and USO-5 (see Figure 2) and a total of four springs depending upon granted access and flow. Three of the springs are located in Main Canyon, MC-C, MC-B and 49-1563 (see Figure 1.1 in the Appendix B monitoring program). The fourth spring is PR Spring located adjacent to Seep Ridge Road (see Figure 1.1 in the Appendix B monitoring program).

The parameters to be monitored at the wells and at each spring are: Flow, Total Dissolved Solids (TDS), pH, basic anions and cations and a d-limonene tracer (the solvent used in the process). The frequency of monitoring will be three times a year for the first two years, and twice a year thereafter. Summary reports will be submitted to the Division of Oil, Gas and Mining upon request and/or annually with the annual mining progress reports.

WATER RIGHTS

According to online records of the State Engineer's Office, (Utah Division of Water Rights) there are a number of water rights in the region, as shown in Table 8 and on **Figure 9**. None of these would be affected by the operator's operations.

Table 8: Water Rights

Water Right No.	Water Source	Quantity (cfs)	Use	Water Right Owner
49-55	Unnamed Spring	0.002	Stock watering	John S. Purdy
49-57	PR Springs	0.002	Stock watering	John S. Purdy
49-193	Unnamed Spring	0.025	Stock watering	Alameda Corp.
49-196	PR Springs	0.021	Stock watering	Alameda Corp.
49-262	PR Springs	0.011	Domestic & stock watering	BLM
49-495*	Meadow Spring	0.015	Stock watering & wildlife	SITLA
49-496*	South PWR Meadow Spring	0.015	Stock watering & wildlife	SITLA
49-497*	North PWR Meadow Spring	0.015	Stock watering & wildlife	SITLA
49-498*	West Willow Reservoir #3	0.25	Stock watering & wildlife	BLM
49-499*	West Willow Reservoir #2	0.25	Stock watering & wildlife	BLM
49-500*	PR Reservoir	0.25	Stock watering & wildlife	BLM
49-504*	Jacks Canyon Spring	0.015	Stock watering & wildlife	BLM
49-1504	Unnamed Spring	0.05	Stock watering	SITLA
49-1505	Unnamed Spring	0.05	Stock watering	SITLA
49-1506	Unnamed Spring	0.05	Stock watering	SITLA
49-1508	Unnamed Spring	0.05	Stock watering	SITLA
49-1512	Horse Canyon Unnamed Spring	0.05	Stock watering	SITLA

adjacent land. Camp staff will monitor the perimeter of the camp area for signs of erosion or other water damage. The northwest side of the camp pad and access road are each constructed with drainage ditches along the perimeter of the structures to prevent water from pooling on the access road or along that side of the camp.

All BMPs will be regularly inspected, and maintained in operable condition. These above-noted types of BMPs are also described in the SWMP, which is included in **Appendix G**.

AIR QUALITY

~~The Phase 1 project is designed to minimize potential air quality impacts, including mechanisms or best management practices to minimize the following:~~

- ~~Fugitive dust from stripped lands, the mine pit, OIS storage areas, backfill, and topsoil stockpiles.~~
- ~~Fugitive dust from the plant site area and ore stockpiles.~~
- ~~Emissions from the equipment used to mine, haul and separate bitumen from the ore.~~
- ~~Fugitive dust from newly reclaimed lands.~~

~~Fugitive dust will be minimal from ore piles as the oily consistency of raw ore does not allow it to readily become airborne. Overburden and interburden may or may not be moist, depending on current weather conditions.~~

~~Once the oil is removed from the ore, clean processed solids remain. As the solids from the plant will be damp-dry (less than 20 percent moisture), wind generated airborne particles are expected to be minimal but will be actively monitored; if necessary, water trucks will be utilized to reduce and control any fugitive dust.~~

~~Haul roads will be sprayed regularly with water from a water truck. Water will be obtained from one of the production wells, in-pit storm water sumps or the processing plant storm water pond. Roads that are in use during most or all of the Phase 1 project may be covered with sub-grade ore to aid in dust suppression. Portions of the plant site may be similarly paved with sub-grade ore.~~

~~The operator will continue to coordinate with EPA on air permitting to sufficiently address the above air quality issues, including those associated with equipment emissions. The operator intends to comply with the conditions set forth by EPA.~~

CULTURAL RESOURCES

Cultural resources were reviewed and inventoried onsite during surveys completed in April 2014 for the water wells and road/pipeline, April 2014 and May 2007 for the PR Spring Mine and plant site, and May 2011 for the man camp. No

reservation which has been determined by the federal courts to be Indian Country and is therefore subject to EPA jurisdiction.

USOS calculated the potential emissions from equipment in the Plant area and those emissions are below federal permitting thresholds for minor sources operating in Indian Country. *See* 40 CFR Part 49 (Federal Minor New Source Review Program in Indian Country). The only non-fugitive emissions from the Project will result from the onsite diesel-fired generator, natural-gas fired generators, and process heaters. USOS has assessed the facility's potential emissions based on maximum process rates and the manufacturers' guaranteed emission factors for this equipment. Consistent with federal requirements, the operator will submit to EPA a registration of its emission sources with actual emissions within 90 days of beginning operations. 40 CFR 49.160(c)(1)(ii).

The portion of the Project in Grand County only has the potential to generate fugitive emissions, which are subject to state best management practices. Utah DAQ requires mining operators to develop best management practices to reduce fugitive dust associated with mining activities, including control measures designed to minimize fugitive dust during site preparation, mining, and reclamation operations. Utah Administrative Code R307-205-7 (requiring minimization of fugitive dust from mining activities). A fugitive dust plan that ensures compliance with these requirements is in place and USOS has extended these state requirements to the entire Project, including the areas that are not within the jurisdiction of Utah DAQ. An overview of the best management practices included in the fugitive dust plan are set forth below:

- The fugitive dust will be minimal from ore piles as the oily consistency of raw ore does not allow it to readily become airborne. Overburden and interburden may or may not be moist, depending on current weather conditions. Once the oil is removed from the ore, clean processed solids remain. As the solids from the plant will be damp-dry (less than 20 percent moisture), wind generated air borne particles are expected to be minimal but will be actively monitored; if necessary, water trucks will be utilized to reduce and control any fugitive dust.

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Cultural resources were reviewed and inventoried onsite during surveys completed in April 2014 for the water wells and road/pipeline, April 2014 and May 2007 for

U.S. OIL SANDS, INC.

PR SPRING MINE
WATER MONITORING PLAN

PER 2014 REVISED NOTICE OF INTENTION TO COMMENCE LARGE MINING OPERATIONS

PR SPRING MINE
UINTAH AND GRAND COUNTIES, UTAH

(HAL Project No.: 366.02.100)
SEPTEMBER 2015

Project Manager

HANSEN ALLEN & LUCE inc
ENGINEERS

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1.0 INTRODUCTION

U.S. Oil Sands, Inc. (USOS) has submitted an application for an oil sand mining project (Project) in Uintah and Grand Counties, Utah, approximately 65 miles southeast of Roosevelt, Utah. In a letter dated July 17, 2015, the Utah Division of Oil, Gas and Mining gave final approval for the project conditioned on USOS "amending the Notice of Intention to Commence Large Scale Mining Operations (NOI) to (1) establish a monitoring program for potential effects to the possible subsurface water system, and (2) include further evidence of the Operator's compliance with the appropriate air quality regulatory authority or authorities". This Monitoring Plan (Plan) is submitted to address Condition 1 of the Decision. In general, the purpose of the monitoring program is to provide short and long term data to show De Minimis impact to the ground water system as a result of mining operations. This will be accomplished through the following activities.

- The monitoring and recording of water quality from two on-site USOS wells water production wells.
- The monitoring and recording of spring water discharges and water quality.
- The scheduled review of the data to evaluate impact to the local subsurface water system, if any.

Existing water sources were reviewed and evaluated for inclusion in the monitoring program, including existing ground water wells and local springs. Spring MC-A, noted during the DOGM informal hearing held on June 30, 2015 is a spring source that was intended to be included within the monitoring program. The owner of the land and water right 49-1664 (spring MC-A), The owner was contacted during a June 9, 2015 site visit wherein permission was granted to visit the spring. However, a repeated attempt to gain access to and monitor the spring as part of this monitoring plan has been rejected. The owner will no longer allow access to the spring. Since spring MC-A is located on private land and is inaccessible to monitoring it has been eliminated from inclusion in the monitoring plan. The location of the mining operation along with wells and springs to be monitored are shown on Figure 1.1. A discussion of each of these water sources follows.

1.1 SUBSURFACE WATER INVENTORY

Subsurface water sources, including potential ground water aquifers, wells, and springs have been reviewed, documented and evaluated as part of the mine permitting process.

Shallow Aquifers. Significant geologic data, including the vast amount of data gleaned and developed by USOS through the drilling and exploration of dozens of exploratory wells has been submitted by USOS as part of the permitting process. The collection of this data has provided the basis for a clear understanding of local hydrogeology. Two basic conclusions reached through this exploration are that 1) there is no identifiable water zone or aquifer identified within the proposed mine area to depths of at least 350 feet, and 2) the geologic strike and dip is to the north-northwest. Based on these findings and documented conclusions, there are no sustainable aquifers that have been identified within the area to be mined.

Figure 1.1. Site Location Map

Wells and Deep Aquifers. Local ground water has been encountered at depth within USOS's wells PW-1 and USO-5, which are in excess of 2,500 feet deep (see Figure 1.1 for location). No other producing wells are known to exist within the project area and vicinity. General information related to these USOS wells is provided in Table 1.1. Latitude and Longitude information was taken from Google imagery using the WGS84 datum.

Table 1.1. Well Data

Well #	Depth (ft)	Dia (in)	Top of Casing Elevation (msl)	Static Water Level (msl)	Latitude	Longitude
PW-1	2,549.7	10	7,880.9	6,367.9[1]	N 39° 28.072'	W109° 19.843'
USO-5	2,600.0	5.5	8,043.0	6,347.0[1]	N 39° 28.107'	W109° 19.130'

1) Data taken 9/22/2012

The main purpose of these two USOS wells is to provide the water source needed for mining and processing operations. However, they have been incorporated into the monitoring plan to document water quality at depth northwest and west of the mine area. Water quality data from the deep wells will be useful for confirming the lack of connectivity between mining operations and deep ground water.

Springs. Only a few isolated springs have been identified and documented within the permit application and adjacent area. Springs to be included in the monitoring plan are shown in Figure 1.1. These local and adjacent springs include PR Spring located east of the mining operation, two springs (MC-B and MC-C) located south and west of the mining operation within Main Canyon, and a spring identified by water right 49-1563 located in a tributary to Main

Canyon south of the mine. Springs MC-B and MC-C are located on property owned by Mr. Burt DeLambert, spring 49-1563 is a spring owned by the State Institutional Trust Lands Administration (SITLA), and PR Spring has public access. Table 1.2 provides the GPS coordinates for these four springs which were collected using a Garmin Rino 530 GPS unit during site visits by Dr. David Hansen of Hansen, Allen & Luce, Inc. on June 9, 2015 and August 19, 2015, again using a WGS84 datum. Photographs of each spring taken during the site visits are shown in Photos 1.1, 1.2, 1.3 and 1.4.

Table 1.2. Spring Location Data

Spring	Latitude	Longitude
PR Spring	N 39° 27.716'	W109° 17.052'
49-1563	N 39° 27.004'	W109° 18.248'
MC-B	N 39° 27.467'	W109° 19.152'
MC-C	N 39° 28.217'	W109° 22.269'

Photo 1.1. PR Spring Looking Southwest

Photo 1.2. Spring 49-1563 Looking East

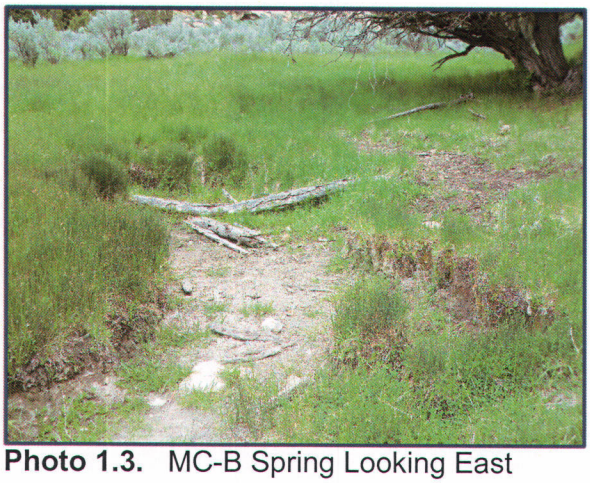

Photo 1.3. MC-B Spring Looking East

Photo 1.4. Spring MC-C Looking Southeast

1.2 SITE VISIT OBSERVATIONS

A complete discussion of site observations and conclusions made during the June 9, 2015 site visit are documented in the memorandum included within Appendix A. The memorandum documents the locations of each spring visited, its condition, and its source. The August 19, 2015 site visit was conducted for the purpose of observing each of the spring sampling locations with April Abate of DOGM. Springs visited on August 19th included MC-B, MC-C, 49-1563 and PR Spring. As noted above, Spring MC-A is located on private property and was inaccessible. Without exception, all springs were found to be emanating from an east or south bank, either east, south or west of the project area. It was also clearly observed that PR, MC-C and 49-1563 springs issue at a geologic interface on top of confining bedrock. It is believed that similar conditions would be found related to Spring MC-B if the soils which have accumulated at the spring were removed. For the above reasons it is firmly believed that all noted springs are hydrologically disconnected from the project area. The general conclusion for each spring, and a general summary as documented within the memorandum included in Appendix A are as follows.

> ***PR Spring.*** *"The recharge area for PR Spring is believed to be to the south and east and in my opinion will not be affected by the proposed mining operation outlined in the permit."*
>
> ***Spring MC-B.*** *Although this spring was not flowing in June 2015, the "recharge area for Spring MC-B is from the south and east and is hydrologically separated by Main Canyon from the mining operation. There is no possible hydrologic connection between Spring MC-B and the proposed mining operation outlined in the permit."*
>
> ***Spring MC-C.*** *"All springs in and around the area of MC-C, including the small spring located west of MC-C were found along the south and east sides of the alluvial valley, at the base of the adjacent hillsides, and at bedrock interfaces. Recharge to these Spring and Seep areas is believed to be from the south and east, and in my opinion is hydrologically disconnected from and will not be affected by the proposed mining operation outlined in the permit.*
>
> ***General Summary.*** *"Based on my field investigation I find no potential hydrologic connection(s) between the U.S. Oil Sands project and any of the springs investigated on June 9, 2015 as documented within this memorandum."*

Conclusions related to Spring 49-1563 at the time of the site visit are similar in nature in that the spring is separated from the mining operation by two major side channel drainages, and is located in a north-south tributary with flows issuing from the west facing slope. Recharge is from the south and/or east. There is no possible hydrologic connection between Spring 49-1563 and the proposed mining operation outlined in the permit.

Although it is believed that there is no connection between the mining operation and the springs, this monitoring plan has been developed to confirm this through the monitoring and evaluation as defined herein.

2.0 MONITORING PLAN

Subsurface water conditions will be monitored through the collection of data from USOS water production wells and from area springs as discussed in Section 1.0. The monitoring sources, proposed monitoring parameters, and schedule are discussed below.

2.1 MONITORED WATER QUALITY PARAMETERS

The purpose of the monitoring program is to identify potential mining impacts, if any, upon the local ground water hydrologic system. To do this the plan has been developed to include those water quality parameters which will 1) develop a base data set (Phase I Monitoring) documenting natural conditions prior to any potential impact by the mining operation which will help identify and classify the waters within the natural system, and 2) monitor any hydraulic connectivity between the mine and the water sources through the monitoring of a key water quality tracer (Phase II Monitoring). Under this monitoring plan a two year time frame is proposed for Phase I Monitoring. Phase II Monitoring will continue following Phase I Monitoring.

Phase I Monitoring will provide base water quality conditions at all sources due to their remote locations and distances from initial mining operations. Spring 49-1563, the closest spring is located approximately 5,400 feet from the first area to be mined near the plant site. Using a permeability of 1 meter per day (3.21 fpd) for the Green River Formation[1], the time of travel to this spring would be 1,682 days, 841 days if the velocity is double. Given this time of travel, base conditions can be determined within the Phase I Monitoring period.

Parameters selected to achieve this objective include Total Dissolved Solids (TDS), pH, basic cations including Sodium (Na), Calcium (Ca) and Magnesium (Mg), basic anions including Bicarbonate (HCO_3), Sulfate (SO_4) and Chloride (Cl), and d-limonene (the product used during the oil separation process). The purpose for each of these parameters is as follows. Diesel organics are not proposed to be sampled or monitored as part of this plan as 1) they are present naturally and 2) it would be difficult to impossible to distinguish variations due to mining activities.

TDS and pH. These parameters will be monitored to detect basic changes in quality resulting from the mining operation. TDS will monitor changes in dissolved solids and pH will monitor changes in acidity.

Anions and Cations. These parameters will be monitored during Phase I Monitoring to evaluate variations in general water quality for the purpose of potentially verifying different water sources for the sampled locations, and to document natural conditions. Anions and cations are not proposed to be monitored long term as it is felt they do not offer significant contribution to a determination of mining impact, the purpose for the monitoring program.

d-limonene. ChemTech-Ford laboratories (ChemTech) in Midvale, Utah was provided a new untouched sample of d-limonene, the product to be used in the process. ChemTech ran tests in August 2015 on the product using the semivolatile protocols (Method 8270) and determined that this is the best method to detect d-limonene. Using this method, and with a minimum 30 mL sample, ChemTech can detect to a limit of 5 ppb.

[1] Characterization of Oil Reservoirs in the Lower and Middle Members of the Green River Formation, Southwest Uinta Basin, Utah, AAPG Rocky Mountain Section Meeting, Laramie, Wyoming, September 2002.

Sampling protocols to be used for include the following:

1. Although only a 30 mL sample is required for the test, a minimum ½ pint sample will be collected.
2. No preservative is required.
3. Samples are required to be collected in Glass bottles.
4. The bottles are to be Amber in color, not clear to protect the integrity of the sample.
5. ChemTech will provide the sample bottles.
6. Samples must be received in a timely manner so that the product can be extracted by the lab within 7 days of collection. Therefore, samples will be scheduled for a Monday thru Wednesday so that they can be shipped and received by the lab during the work week.

USOS is the only local mining operation known to use d-limonene in their process. As such, the use of d-limonene as a tracer element and the fact that it can be easily sampled and detected is ideal. As such, testing for this element at each sampling location will document any connection or lack of connection with the mining operation.

Water quality samples will be collected from each site according to the schedule shown in Table 2.1.

Table 2.1. Water Quality Parameters[1]

Source	Phase I Monitoring 0 - 2 Yrs	Phase II Monitoring > 2 Yrs
PW-1 Well[2]	TDS pH Anions – HCO_3, SO_4, Cl Cations – Ca, Mg, Na d-limonene Tracer	TDS pH d-limonene Tracer
USO-5 Well[2]		
PR Spring		
49-1563		
MC-B		
MC-C		

1. Collection contingent upon obtaining permission from private land owners granting continued access to the spring source.
2. A single combined well sample is to be collected unless d-limonene is detected, then the samples will be taken independently.

Source water from wells PW-1 and USO-5 are combined prior to usage at the plant. Because of this only a single sample will be collected from these combined sources. If however, d-limonene is detected from the combined well sample, separate samples will be taken thereafter at each source before the flows are combined to determine from which well the d-limonene originated.

2.2 SAMPLING FREQUENCY

Flow. The frequency for flow sampling is provided in Table 2.2. Water flow from the project's production wells and flow at each spring during Phase I Monitoring will be measured three times per year since winter access will be limiting. The three samples are proposed during the spring, summer and fall periods. Bi-annual monitoring is proposed after 2 years.

Table 2.2. Water Flow Monitoring Frequency

Source	Phase I Monitoring (0 - 2 Yrs)		Phase II Monitoring (> 2 Yrs)	
	Flow	Water Level	Flow	Water Level
PW-1 Well	Spring (Mar – May) Summer (Jun – Jul) Fall (Aug – Oct)		Bi-Annually (Mar – Jun) (Jul – Oct)	
USO-5 Well				
PR Spring				
49-1563[1]				
MC-B[1]				
MC-C[1]				

1. Contingent upon obtaining permission from private land owner to grant access to the spring source.

Data from wells and springs will be collected and monitored on an ongoing basis and all data collected shall be submitted annually to the Division of Oil, Gas and Mining. Data collected from private springs 49-1563, MC-B and MC-C shall be shared with the owners of said springs if requested.

Quality. Water quality parameters identified in Table 2.1 will be collected each time a flow is taken per the sampling frequency shown in Table 2.3. Data collected will provide needed information to confirm water quality impact to any of the identified water sources. Consideration was given to shorter time frames but a reduced frequency is considered unwarranted given the distance and overall attenuation and travel time between the mine and the individual monitored source.

Table 2.3. Water Quality Monitoring Frequency

Source	Phase I Monitoring (0 - 2 Yrs)	Phase II Monitoring (> 2 Yrs)
PW-1 Well	Spring (Mar – May) Summer (Jun – Jul) Fall (Aug – Oct)	Bi-Annually (Mar – Jun) (Jul – Oct)
USO-5 Well		
PR Spring		
49-1563[1]		
MC-B[1]		
MC-C[1]		

1. Collection contingent upon obtaining permission from private land owner to grant access to the spring source.

2.3 SUNSET CLAUSE

At this discretion of USOS, at cessation of mining, or if it is found after 10 years of mining and each 10 years thereafter, that there has been no identifiable impact upon local springs, a request may be made to the Division to terminate the requirement for ongoing monitoring. Any request filed will be based on a re-evaluation of all data collected to date by an independent Civil Engineer with at least 10 years' experience specializing in both surface and ground water hydrology. Following the receipt of said independent re-evaluation, the Division will consider and either accept or deny the request.

3.0 REPORTING

3.1 DATA EVALUATION

Data collected as part of this Plan will be submitted to DOGM at any time upon request. As a routine part of this monitoring plan the data will be summarized annually in a memorandum report during the first quarter of the year and submitted to DOGM. The annual report will include the following information.

1. DATA
    a. Raw well and spring flow.
    b. Raw water quality field data and laboratory test results.
    c. Graphed flow and water quality data.

2. EVALUATION
    a. An evaluation and statement of discharges, water quality and noted changes, if any.
    b. A discussion regarding the presence or absence of d-limonene at each monitoring location and the hydraulic connection between the mine site and each tested source based on the presence or absence of d-limonene in analyzed samples.

Appendix A

Summary Report

Field Observations and Conclusions
Based on June 9, 2015 Site Visit

SUMMARY REPORT
Field Observations and Conclusions
Based on June 9, 2015 Site Visit

SUMMARY MEMORANDUM:

This memorandum summarizes the site visit conducted by Dr. David E. Hansen at the U.S. Oil Sand Project Site on the Tavaputs Plateau, Utah on June 9, 2015. The site visit was conducted to visually review and/or confirm findings and observations documented by Hansen, Allen & Luce, Inc. (HAL) in April 2015 of the "Hydrogeochemistry of Perennial Springs on the Tavaputs Plateau, Utah, USA: Significance to Tar Sand Mining, Processing, and Disposal of Adjacent Ridges, January 30, 2015."

INTRODUCTION

Dr. David Hansen met with Doug Thorton the morning of June 9, 2015 to discuss the overall oil sand project and spring access points. Contact was made by Mr. Thorton with the rancher located in Main Canyon for permission to access the lower spring sites near the ranch house and Main Canyon reservoir. For consistency of review the springs are referenced herein using the same numbering system as was used in the report referenced above and as shown in Figure 1. PR Spring is located approximately 0.55 miles east of the project site within PR Canyon and Springs MC-A, MC-B and MC-C are located within Main Canyon south of the project site. Spring MC-A is located farthest up canyon, MC-B is located approximately 0.8 miles downstream of MC-A, and MC-C is located approximately 0.3 miles up canyon from the reservoir located near the ranch house.

All four springs were visited on June 9, 2015 where photographs were taken and GPS locations documented using a Garmin Rino 530 GPS unit. Discussions related to each spring follow.

Figure 1. Spring Location Map in Relation to the Project Site (shown shaded)

OBSERVATIONS

PR Spring

The coordinates for PR Spring are 39° 27.716'N, -109° 17.052'W. The spring discharges from the east side of a small side drainage of PR Canyon near the ridge line at the location shown in Figure 2.

Figure 2. PR Spring, Overflow and Drinking Water Faucet

Photos 1 thru 4 below taken during the site visit show the general layout of the spring and facilities. Photo 1 was taken from the parking area and shows the public drinking water faucet in the foreground, the wet area which has been created by the tank overflow or additional local seepage, and the spring collection area near the upper middle portion of the photograph. Photo 2 shows the spring collection area and appurtenant facilities. Photo 3 shows what is believed to be the overflow from the storage tank located within the spring collection area. It would appear that without any demand on the faucet, the overflow represents the amount of water issuing from the spring which at the time of the site visit was approximately 1 gpm. Photo 4 shows the spring collection area looking north.

Photo 1. PR Spring, Overflow and Faucet

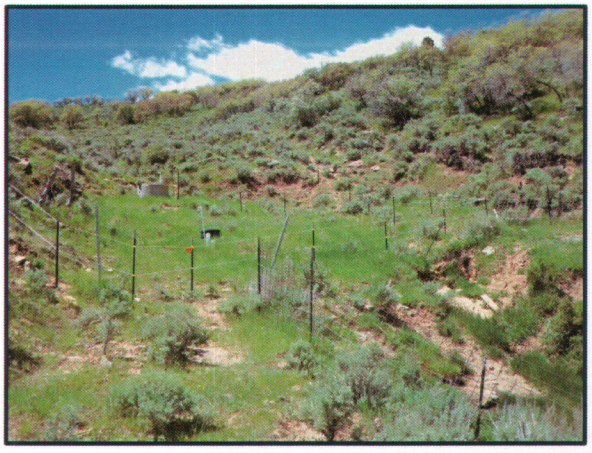

Photo 2. PR Spring Collection Area Looking So.

Photo 3. PR Spring Tank Overflow

Photo 4. PR Spring Looking N.

General Conclusion

The recharge area for PR Spring is believed to be to the south and east and in my opinion will not be affected by the proposed mining operation outlined in the permit.

Spring MC-A

Access to this spring from the east is limited by a locked gate at the property line of the local land owner. However, access was granted by the land owner via a phone call made from the ridge above PR Spring. The coordinates for Spring MC-A are 39° 26.903'N, -109° 18.640'W. The spring discharges from the east side of the drainage (west facing slope) of Main Canyon near the intersection of a small side drainage. It is located approximately 15 vertical feet above the channel bottom. Without significant local landmarks an aerial image of the spring location does little more than that shown in Figure 1. Photographs however taken during the site visit however provide valuable information.

The spring has been developed by the local land owner and is piped approximately 1,700 feet to his cabin and development. Photo 5 was taken looking east and shows the crude log fence that has been constructed to protect the spring. Photo 6 shows the spring itself, the great majority, if not all of the

flow, was coming from the small concentrated area shown in the photograph. The spring issues along the interface of the bedrock formation shown in Photo 6. Documentation of this bedrock is also seen in Photo 7 where the spring was noted to issue near the top of the photograph above the layered bedrock to the right of the vegetation.

Photo 5. Spring MC-A

Photo 6. Spring MC-A Discharge Area

Photo 7. Spring MC-A Rock Interface

General Conclusion

The recharge area for Spring MC-A is from the south and east and is separated by two major side channel drainages from the mining operation. There is no possible hydrologic connection between Spring MC-A and the proposed mining operation outlined in the permit.

Spring MC-B

Access to Spring MC-B from the south was also limited by the locked gate referenced within the discussion for Spring MC-A. However, as noted above access was granted by the land owner to access the spring. The coordinates for Spring MC-B are 39° 27.467'N, - 109° 19.152'W. The spring is located along the south side of Main Canyon at the base of the hillside at the location shown in Figure 3. The Main Canyon drainage channel (located approximately 60 to 70 feet north of the spring) is well incised with the flow line being approximately 10 to 15 vertical feet below the spring. With the deeply incised channel in close proximity, it is unlikely that the spring is related to shallow alluvial waters within Main Canyon, but more likely to recharge from the south and east.

Figure 3. Spring MC-B

At the time of the site visit the spring was found to be undeveloped and dry. Photo 8 was taken looking east toward the spring. The tree shown in the upper right portion of the photograph is located at the base of the north facing hillside. Photo 9 shows the spring in relation to Main Canyon and the incised channel which is located at the far left of the photograph just to the left (north) of the sagebrush which borders the south bank of the Main Canyon channel.

Photo 8. Dry Spring MC-B

Photo 9. Spring MC-B and Main Canyon

General Conclusion

The recharge area for Spring MC-B is from the south and east and is hydrologically separated by Main Canyon from the mining operation. There is no possible hydrologic connection between Spring MC-B and the proposed mining operation outlined in the permit.

Spring MC-C

The coordinates for Spring MC-C are 39° 28.217'N, - 109° 22.269'W. The spring discharges at the confluence of Main Canyon and the side drainage to the south, and is located respectively along the south and east edges of the valley fill as shown in Figure 4. Not previously noted in documentation reviewed by HAL is the presence of two additional spring areas adjacent to MC-C, and one smaller spring located approximately 1,000 feet west of MC-C. Water from Spring MC-C, located within the fenced area, is collected and discharges from the pipe shown in Photo 10.

Figure 4. Spring MC-C and Small Spring

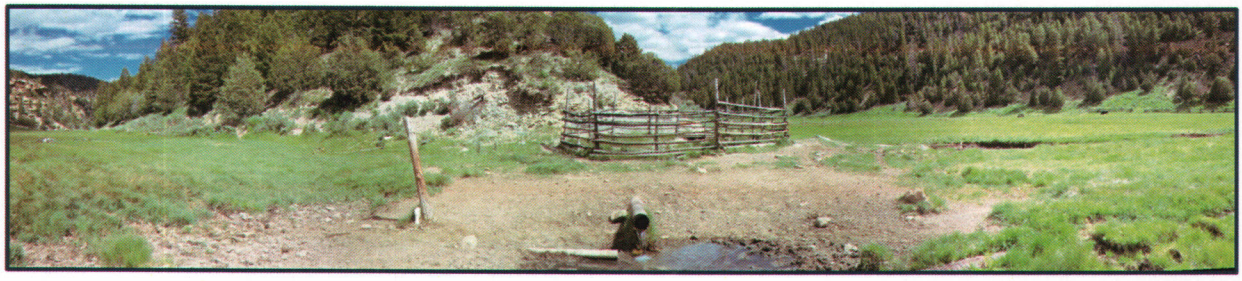

Photo 10. Panorama View of Spring MC-C Looking East to South.

Figure 5 shows a blow up of the MC-C area which can be seen as the fenced area in the figure. According to the property owner Spring MC-C was developed prior to his purchase of the property.

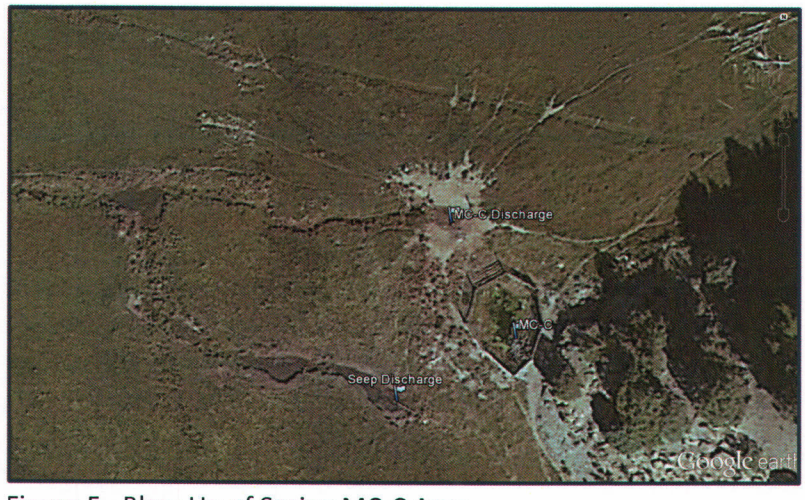

Figure 5. Blow Up of Spring MC-C Area

Subsequent to his purchase of the ranch, the owner had difficulty working a bulldozer within the area south of MC-C due to wet conditions. To better access the area he developed what was found to be a small spring located adjacent to the hill just south of Spring MC-C (bottom area of the photo). Development of this seep area dried up the surrounding land allowing better access. This spring is piped and discharges to the area noted as the "Seep Discharge". The discharge from this seep is shown in Photo 11.

Photo 11. Small Seep Discharge South of MC-C.

Another spring, located at the base of the hill approximately 125 feet east of MC-C was also historically developed to supply water to the ranch house(s). Although unmarked, the pipeline scar is clearly noted angling upward from right to left in the top portion of Figure 5.

A previously unidentified spring (Small Spring) was also noted during the site visit at the location shown in Figure 4. The spring is located directly south of the main ranch house and across Main Canyon. The property owner indicated that the spring flow from this source has been very consistent over the years and is "as good as it has ever been". He also indicated that the spring was originally piped to the historic ranch house but had inadequate pressure and was therefore abandoned for that purpose. It is now used for livestock watering. The spring, which issues from a badly deteriorated pipe, is shown in Photo 12 was noted to be riding out on top of bedrock. The concrete encased pipe noted in the center of the photograph is believed by the owner to have broken off and separated from the spring discharge after years of deterioration and impact by livestock.

Photo 12. Small Spring with Pipe Discharge.

General Conclusion

All springs in and around the area of MC-C, including the small spring located west of MC-C were found along the south and east sides of the alluvial valley, at the base of the adjacent hillsides, and at bedrock interfaces. Recharge to these Spring and Seep areas is believed to be from the south and east, and in my opinion is hydrologically disconnected from and will not be affected by the proposed mining operation outlined in the permit.

Possible Well Impacts

A discussion with the Rancher in Main Canyon revealed that it has been his concern that the exploratory wells and current deeper production wells have impacted local spring flows. This is not believed possible for the following basic reasons.

1. None of the exploratory wells drilled noted any water.

2. The exploratory wells drilled were relatively shallow being approximately 300 feet deep, terminating a few hundred feet above the closest spring, MC-B.
3. The exploratory wells would have been sealed and abandoned to the requirements of the regulatory agency and therefore would be sealed.
4. According to Doug Thorton, the deep well(s) drilled have reported static water levels approximately 1,000 feet below the elevation of the springs. This being the case the wells penetrate aquifer zones different than the springs which all discharge from interfaces with confining bedrock.

SUMMARY

Based on my field investigation I find no potential hydrologic connection(s) between the U.S. Oil Sands project and any of the springs investigated on June 9, 2015 as documented within this memorandum.